

What is claimed is:

1. A method of preventing oxidation of a barrier metal of a semiconductor device, the method comprising:
 - forming a via hole in a substrate;
 - depositing $Ti/Ti_{(1-x)}Al_xN$ as a first barrier metal layer on the bottom and sidewalls of the via hole by means of a plasma chemical vapor deposition;
 - filling the via hole with a plug material to form a via plug;
 - performing a planarization process to flatten the via plug;
 - depositing a second barrier metal layer and a metal line in sequence on the substrate including the via plug; and
 - depositing an ARC layer of $Ti/Ti_{(1-x)}Al_xN$ on the metal line by means of a plasma chemical vapor deposition.
2. A method as defined by claim 1, wherein the second barrier metal layer comprises TiN or $Ti/Ti_{(1-x)}Al_xN$.
3. A method as defined by claim 2, wherein “x” in $Ti_{(1-x)}Al_xN$ has a value between 0.5 and less than 1.
4. A method as defined by claim 1, wherein the plug material comprises tungsten or aluminum.
5. A method as defined by claim 1, wherein the plasma chemical vapor deposition is performed using $TiCl_4$, $AlCl_3$, Ar, N_2 , and H_2 gases.
6. The method as defined by claim 5, wherein the ratio of $H_2/N_2/Ar$ is between 20/5/50 sccm and 40/10/50 sccm.
7. A method as defined by claim 1, wherein the plasma chemical vapor deposition is performed using a radio frequency (RF) power between 40W and 60W

at a temperature between 400 °C and 500 °C under a pressure between 1 Torr and 2 Torr.

8. A method as defined by claim 1, wherein “x” in $Ti_{(1-x)}Al_xN$ has a value between 0.5 and less than 1.